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Newport, R.I.**

**EMPLOYMENT CONSIDERATIONS IN THE USE OF
UNMANNED UNDERSEA VEHICLES BY THE OPERATIONAL COMMANDER**

by

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**A paper submitted to the Faculty of the Naval War College in partial satisfaction of
the requirements of the Department of Joint Military Operations.**

**The contents of this essay reflect my own personal views and are not necessarily
endorsed by the Naval War College or the Department of the Navy.**

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ABSTRACT

EMPLOYMENT CONSIDERATIONS IN THE USE OF UNMANNED UNDERSEA VEHICLES BY THE OPERATIONAL COMMANDER

Unmanned Undersea Vehicles (UUVs) are among the latest undersea warfare capabilities in various stages of development and delivery to the warfighter. Fielding of these systems serve both as force multipliers and risk reduction agents and offer new efficiencies to the operational commander with regard to the factors of space, time, and forces. While the integration of UUVs into maritime missions is steadily proceeding, existing maritime law on the rules governing these systems is ambiguous at best. When this new technology converges with traditional maritime law, the challenges create fog and friction that may hinder their full exploitation and potential. Understanding the relevant issues surrounding this, recommendations will be made to enable maximum use of UUVs by the operational commander.

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EMPLOYMENT CONSIDERATIONS IN THE USE OF UNMANNED UNDERSEA VEHICLES BY THE OPERATIONAL COMMANDER

FUTURE VIGNETTE

Under the auspices of the Proliferation Security Initiative (PSI), information is received regarding a coastal state's intent to transport Chemical, Biological, Radiological, Nuclear, or Explosive (CBRNE) related cargo via a merchant vessel. With a known window of departure, the U.S. Combatant Commander evaluates options to conduct and coordinate surveillance and intercept operations, considering the factors of space, time, and forces. A multipurpose unmanned undersea vehicle (UUV) from a local maritime Task Force is selected for the mission. A warship launches the UUV. Once deployed, the UUV executes an over-the-horizon pre-programmed intercept mission to monitor the suspect merchant vessel.

On arrival, the UUV uses organic sensors and gathers information on the merchant to facilitate sustained detection and tracking. Throughout, periodic data transfer is conducted via satellite uplink. The UUV continues to collect information and track the vessel until it hands off the task to other sources. At this point the UUV mission is completed. The information provided by the UUV was fundamental in establishing a track early on against the highly suspect vessel, and afforded the Combatant Commander the necessary time to plan and coordinate his course of action.

INTRODUCTION

“President George W. Bush, Secretary of Defense Donald Rumsfeld, and Secretary of the Navy Gordon England have stated publicly that unmanned vehicles are integral to defense transformation.”¹ The Navy’s Sea Power 21 states that “to detect and defeat threats, force sensors and weapons will be integrated to produce battlespace dominance on, above, and below the sea ... through ... development of a family of unmanned underwater vehicles.”²

UUVs offer new efficiencies to the operational commander with regard to the factors of space, time, and forces. The application of this innovative technology provides extended combat reach and unprecedented undersea access, bolstering operational *space* planning. This access, coupled with advances in communication frameworks, expands the sphere of battlespace dominance for U.S. forces. The ability to be launched by a variety of globally situated air-surface-subsurface platforms or shore positions reduces the dependence on slow, dedicated legacy assets thus, reducing the *time* to obtain and maintain Maritime Domain Awareness (MDA). In an era of military transformation that includes ongoing, “right sizing” of the military, UUVs serve as force multipliers. They perform high-risk missions, reduce the risk of friendly force fatalities, and enable more efficient employment of manned warships, which increases the efficient use of operational *forces*. A host of specific missions for which UUVs are uniquely qualified are identified in Sea Power 21, and are the impetus for the Navy’s UUV Master Plan.³

UUV systems have been in planning since 1994, with ever increasing delivery of systems to the operational commander since 2004. UUVs demonstrated their potential during Operation Iraqi Freedom (OIF) where they were used to conduct low-visibility

underwater mine and obstacle detection and clearance operations. During OIF, the UUV supported multiple missions covering two and a half million square meters of inland waterways to enable three ports to be readied for incoming humanitarian shipments.⁴ As a part of naval transformation, these systems will continue to evolve to meet the needs of operational commanders. Concurrently, the Navy is leveraging advanced commercial UUV technologies, which illustrates that UUV use and development is not just a military trend.

One significant concern with UUV employment, however, is that existing international law concerning its status and maritime passage rights is ambiguous at best, and may pose restrictions on the lawful and legitimate exploitation of their capabilities. *Current international maritime law and the law of naval operations does not adequately address the use of UUVs at sea.* As such, a window of opportunity exists for the United States to create and shape the way UUVs are viewed under international law, and through development of state practice, to ensure that international law trends are favorable to the UUV uses Joint Force Commanders require.

UUV OVERVIEW

A UUV is defined by the U.S. Navy as, “a self-propelled submersible whose operation is either fully autonomous (pre-programmed or real-time adaptive mission control) or under minimal supervisory control and is untethered except, possibly, for data links such as fiber optic cable.”⁵

Military UUVs are intended to operate principally submerged and independently for extended periods of time ranging from tens of hours to hundreds of hours.⁶ Surface intervals would occur during events such as deployment and recovery, transmission of data, collection of surface data, and transit where and when required.⁷ UUVs are to perform their mission in

a similar fashion to manned legacy equivalents, and operate at distances largely beyond the line-of-sight of the host platform.⁸ Their autonomous nature dictates that UUVs have sensors equivalent to those used by today's vessels for navigation, as well as the ability to interpret and avoid potentially dangerous situations.⁹ These functions are considered part of the baseline UUV, independent of any mission specific sensor systems.

Missions and Vehicle Classes

Sea Power 21 categorizes future naval warfare within the three core pillars of Sea Shield, Sea Strike, and Sea Basing, enabled by ForceNet.¹⁰ The U.S. Navy UUV Master Plan identifies nine prioritized missions also known as UUV "Sub-Pillars." The UUV Master Plan was accepted and approved by the Navy in November 2004. The prioritized missions include Intelligence, Surveillance, and Reconnaissance (ISR); Mine Countermeasures (MCM); Anti-Submarine Warfare (ASW); Inspection/ Identification (ID); Oceanography; Communication/ Navigation Network Node (CN3); Payload Delivery; Information Operations (IO), and Time Critical Strike (TCS).¹¹ An overview of each mission is summarized in the Appendix.

The UUV Master Plan identifies four standardized UUV classes that support mission requirements and projected operating environments while maximizing commonality, minimizing cost, and factoring the need for host support elements. From smallest to largest they are respectively the Man Portable, Light Weight Vehicle (LWV), Heavy Weight Vehicle (HWV), and Large Class.¹² Table 1 depicts the specific attributes of size, displacement, and endurance associated with each class of UUV.

Table 1. UUV Class Attributes¹³

Class	Attributes	Size (diameter)	Displacement	Endurance Low Hotel Load
Man Portable		3-9 inches	10-25 pounds	10-20 hours
Light Weight Vehicle (LWV)		12.75 inches	~500 pounds	20-40 hours
Heavy Weight Vehicle (HWV)		21 inches	<3000 pounds	40-80 hours
Large Class		>36 inches	~20,000 pounds	>> 400 hours

Operating Environment

The UUV is hailed by its users as enabling missions in water too shallow for conventional platforms, while accelerating operational timelines, and mitigating risk to forces. In discussing the expected operating environment of UUVs, it is important to understand not only the factors of space, time, and forces, but also the manner of intended operation. A closer analysis reveals that the factor of *space* and the manner of operation are most prevalent.

“Battlespace control near land is essential to ensure prompt access and freedom of maneuver for joint forces moving from the sea to objectives deep inland.”¹⁴ As such, the strategy of today’s Navy is targeted at increasingly complex and challenging roles across the spectrum of littoral operations. The UUV Master Plan’s vision states that UUVs shall be used to “attack today’s littoral coverage problem and tomorrow’s advanced threat.”¹⁵ Littoral waters encompass the shallow seas adjacent to shorelines and can extend to the edge of the continental shelf bordering the open ocean.¹⁶ Depending on location and breadth, this area may include both national and international waters.

The manner of operation must also be considered. In general, of the identified UUV missions, many are specifically intended as either low profile operations in support of special

operations forces, or clandestine operations for purposes such as reconnaissance or payload delivery. Several are proposed as operating openly. The UUV missions to vehicle classes are illustrated in Table 2.

Table 2. UUV Missions to Classes¹⁷

UUV Classes Missions	Man Portable	LWV	HWV	Large Class
Intelligence, Surveillance, and Reconnaissance	Clandestine Special Purpose	Clandestine Harbor	Clandestine Tactical	Clandestine Littoral
Mine Countermeasures	VSW to SW Search, Classify, Map (SCM)	Operations Area Clearance	Clandestine Reconnaissance	Clandestine Payload Delivery
Anti-Submarine Warfare				Clandestine Hold at Risk
Inspection/ Identification	Search of Ship, Piers, Moorings for Explosives			
Oceanography		Special Purpose	Littoral Operations	Long Range or Clandestine Payload Delivery
Communications/ Navigation Network Node	Low profile VSW SOF/ EOD Missions	Low profile Mobile CN3		Clandestine Payload Delivery
Payload Delivery				Clandestine Payload Delivery
Information Operations		Clandestine Network Use	Clandestine Sub Decoy	
Time Critical Strike				Clandestine Payload Delivery

VSW = Very Shallow Water, SW = Shallow Water

As Table 2 demonstrates, UUVs are intended to operate predominantly within littoral waters and in many cases in a clandestine manner. The legal ramifications of these facts require further investigation.

Theoretically, the UUV affords the operational commander the ability to fully exploit the area on, above, and below the ocean's surface, operating everywhere from deep open-ocean to the near-shore very shallow littorals. However, international maritime law and law

of naval operations limit access, i.e., the factor of *space*. The questions that must be asked are first, how this legal framework impacts the maritime access desired by the operational commander and second, how this may inhibit the freedom of movement offered by UUVs.

UNITED NATIONS LAW OF THE SEA

International law with regard to the maritime regime is complex and multifaceted. At its most simple and fundamental level, it addresses maritime boundaries and associated navigational rights to include safety at sea. The United Nations Convention on the Law of the Sea (UNCLOS) came into force as the dominant international law of the sea in 1994. UNCLOS provides a legal framework for the regulation of the complex ocean space, and seeks to balance the rights and entitlements between both coastal and maritime states. Coastal states desire both physical and economic security while maritime states desire freedom of the seas for trade and military operations. These international laws recognize that each nation has fundamental rights and define boundaries and rights of navigation within the sea to protect the interests of both. As a non-Party to the convention, the U.S. observes the non-deep seabed provisions of the convention as customary law.¹⁸ However, U.S. Navy Regulations of 1990 states within Article 0705, that “at all times, commanders shall observe, and require their commands to observe, the principles of international law.”¹⁹

Maritime Boundaries and Navigational Rights - the Factor of Space

Within the U.N. Law of the Sea, maritime boundaries have been established and navigational rights and freedoms vary depending on these boundaries. For an operational commander, it is important to identify these restraints as they may directly affect freedom of movement desired for military operations.

The maritime boundaries are defined from a baseline, which can be described loosely as a line connecting coastal points marked at low tide. From these baselines, boundaries or zones are measured from which waters are generally described as being either national waters or international waters. National waters include internal waters, territorial seas, and archipelagic waters, and are subject to the sovereignty of the coastal nation with limited navigational rights entitled to the international community.²⁰ International waters include the contiguous zone (CZ), exclusive economic zone (EEZ), and the high seas, where high seas freedoms of navigation are observed.²¹ Figure 1 illustrates the generally accepted maritime boundaries delineated within the UNCLOS.

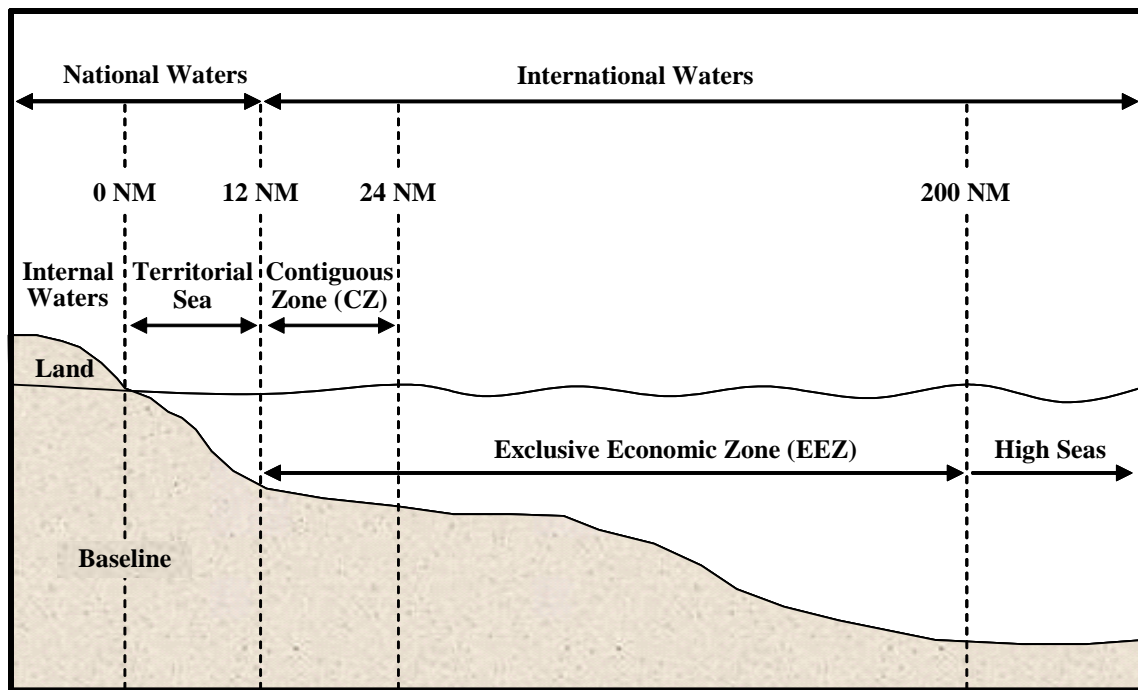


Figure 1. Maritime Boundaries²²

International navigation rights can be parsed into four fundamental categories. They include the Right of Innocent Passage, Archipelagic Sea Lane Passage, the Right of Transit

Passage, and High Seas Freedoms.²³ These navigational rights apply regardless of vessel type to include merchant, auxiliary, or warship.

Right of innocent Passage. Access to national waters is subject to the sovereignty of the coastal state. However, under the right of innocent passage, foreign vessels enjoy the right of continuous, expeditious, and unimpeded surface navigation through the territorial sea of a sovereign state and are further applied to surface passage to or from the coastal state's internal waters subject to conditions of entry.²⁴ Military activities are generally considered to be prejudicial to coastal state security under this right and include the deployment or recovery of any military device, conduct of intelligence collection or survey operations, and any type of force against the coastal state.²⁵

Archipelagic Sea Lane Passage. Archipelagic waters are national waters enclosed within the baseline of an archipelagic nation such as Indonesia or the Philippines. These archipelagic waters are subject to the international right of innocent passage. However, in designated sea lanes, the right of archipelagic sea lane passage entitles foreign vessels to unimpeded transit through the national waters of such states in normal modes of operation so long as the movement is continuous and expeditious.²⁶

Right of Transit Passage. This right permits the “free transit through and over international straits while upholding the needs of major maritime states who could not accept the extension of territorial seas to 12 nautical miles without a corresponding guarantee of an unimpeded right of transit through and over international straits.”²⁷ With the right of transit passage, foreign vessels are afforded unimpeded navigation through most international straits, and may conduct passage in normal modes of operation (including submerged for

vessels designed to be operated normally underwater) so long as passage remains continuous and expeditious.²⁸

High Seas Freedoms. The international legal standard of “due regard” is observed on the high seas. All vessels have unrestricted maneuvering rights in international waters (high seas, exclusive economic zone (EEZ), and contiguous zone (CZ)) with due regard to the rights of other nations to similarly navigate freely.²⁹ Additionally, as long as due regard is maintained, all military operations and exercises are permitted throughout international waters.

Maritime Safety

The International Maritime Organization (IMO) is the competent international organization in the field of maritime affairs for the United Nations. It serves as the common regulating and policy development body for shipping matters among maritime nations. Central to its safety regulatory construct is the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS), to which the U.S. is a signatory.³⁰

Signed in 1972, the COLREGS identify the universally agreed upon conduct and actions on the part of all maritime states in observance of fundamental safety standards for shipping. Its scope is intentionally broad in terms of both the object and breadth of maritime situations that come under its domain. As such, they are subject to interpretation by states. The treaty applies to “all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels.”³¹ Generally, the COLREGS seek to establish guidelines for the safe conduct of surface vessels in any visibility conditions to include steering and sailing rules, lights and shapes, and sound and light signals.

ANALYSIS AND DISCUSSION

UUV Legal Status

The question to be asked is, “what is the legal status of an unmanned undersea vehicle or UUV?” Is it a vessel with navigational rights similar to that afforded manned vessels? To answer this question, international law must be consulted to identify the general universal language applied to a sea going unit as acknowledged by sovereign states. From the COLREGS, the basic sea going unit is the *vessel*. Conversely, the *ship* is the basic unit referred to under U.N. Law of the Sea.

The COLREGS define a vessel as “every description of *water craft*, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water.”³² UNCLOS sets forth rules applicable to all *ships* to include merchant ships, government ships, and warships. These are further categorized into, “merchant ships and government ships operated for commercial purposes,” and, “warships and other government ships operated for non-commercial purposes.”³³

To fully understand these definitions, the terms “water craft” and “ship” must be clear, and are defined within the International Maritime Dictionary.

WATER CRAFT. Generic term for every sort of boat or vessel capable of being used as a means of transportation by water. (de Kerchove 1961, 900)

SHIP. A ship may be defined as a vessel of considerable size adapted to navigation. The word is used as a general term for sea-going vessels of every kind. In maritime law and prize law the word ship is equivalent to vessel and it is not the form, the construction, the rig, the equipment or the means of propulsion that makes a ship, but the purpose and business of the craft as an instrument of marine transportation. (de Kerchove 1961, 722)

From the definitions of a water craft and ship, the common theme extracted is the ability of a *vessel* to be used, “as a means of,” or, “as an instrument of,” marine

transportation. The meaning of transportation can be generally accepted to be the transfer or conveyance of persons or *goods* from one place to another. Since the UUV is not intended to carry passengers, the aspect of goods or *cargo* must be further evaluated.

CARGO. The lading or freight of a merchant vessel. The goods, merchandise, or whatever is conveyed in a ship for payment of freight. A general term for all merchandise carried on board a trading vessel. (de Kerchove 1961, 124)

Cargo, as defined in the International Maritime Dictionary, is specific to either a merchant or trading vessel, where, “payment of freight” is assumed. Thus the gray area of government ships, or vessels, operating for non-commercial purposes enters. If the UUV is capable of goods or cargo transport and operates as a government ship for military purposes, then a strong argument can be made for its classification as a vessel.

UUV Vessel Evaluation

From the aforementioned analysis, the ability to classify the UUV as a vessel can be derived as a direct function of the proposed class and mission. Referring to Table 2, the large class UUV is designated for payload delivery, and clearly meets the definition of a basic vessel to be used as an instrument of marine transportation. This UUV class is intended to support the MCM, Oceanography, CN3, and TCS missions.

To be classified as a vessel, the remaining UUV missions and corresponding vehicle classes would require a more modern or liberal translation of goods or cargo to incorporate the transport of equipment or sensors intended for use by military personnel. Examples include the application of UUVs in support of the Explosive Ordinance Disposal’s MCM and ID missions which uses equipment for search, classification, and survey of waterways, ships, piers, and moorings for explosives; and, the Special Operation Forces’ CN3 mission for mobile communications support. These examples are viewed as reasonably easy to justify

incorporation under the definition of a vessel. The more challenging of the UUV classifications to justify as vessels involve those missions and classes employing specialized instruments for the purpose of information gathering. These classes encompass all the ISR, the MCM reconnaissance, the ASW hold at risk, and the IO missions. In such cases, the more traditional definitions of cargo would require expansion to cover such sensors used in data collection processes.

A Counterargument to UUV Vessel Status

Despite the correlation of UUV classes and missions to the basic definition of a vessel, some would argue against the UUV being assigned vessel status given the absence of any direct human element (i.e., a crew and commanding officer) onboard once deployed.

In reply, the autonomous nature of the UUV is intentionally designed to replace human functions traditionally performed onboard manned platforms. The command element, though not organic to the UUV, can easily be achieved through an external host-vehicle interface via either pre-programmed or real-time adaptive mission control. This could be further enhanced by application of remote monitoring technology similar to that of the Blue Force Tracking System utilized by the U.S. Army and U.S. Marine Corps.

The increased use of UUVs at sea will eventually force a significant global paradigm shift based on centuries of manned ships going to sea. However, the autonomous nature of the UUV should not serve as a sole disqualifying criterion for definition of vessel status simply due to the absence of human presence.

UUV and Law of the Sea

Based on the capabilities and projected classes, it can be argued that UUVs are, at a minimum, vessels, and are entitled to the freedoms extended to all vessels under UNCLOS.

Navigational Passage. The freedom of navigation guaranteed under UNCLOS enables UUV navigation in much of the littoral realm. Specifically, it permits the uninhibited submerged passage in international waters, including the high seas, the EEZ, and the CZ of coastal nations. Free submerged passage is also lawful during transit passage through international straits. Concurrently, the right of archipelagic sea lanes passage through archipelagic waters enables UUVs to pass submerged through those waters.

However, without coastal nation consent, it would not be lawful for a UUV to transit submerged in national waters, including archipelagic waters (outside archipelagic sea lanes), territorial seas, and internal waters. Regardless of the mode of operation, transit passage and innocent passage events must be conducted in a continuous and expeditious manner. Additionally, the UUV must be operated observing “due regard” within international maritime regimes.

Operational Employment. In the operational performance of its mission, the UUV is entitled to uninhibited operations, regardless of mission or manner, within international waters (high seas, the EEZ, and the CZ). Such operations must be conducted with due regard for the rights of other nations to navigate and operate. Within international straits and designated archipelagic sea lanes UUVs are allowed to operate in their normal modes for purposes of navigation and force security only.

The conduct of UUV missions is not lawful under international law within national waters (archipelagic waters outside sea lanes, territorial seas, or internal waters) under any circumstance without the explicit consent of the coastal state involved. The UUV missions reflected in Table 2, regardless of operating mode (submerged or surfaced) or manner (low profile or clandestine) are beyond the rights and freedoms allowed by international law

within national waters. Such events are considered activities prejudicial to the peace, good order, or security of the coastal nation. Engagement in these UUV activities would render the UUV's legal status automatically as non-innocent, in violation of that nation's sovereignty, and subject to that coastal state's legislative and enforcement powers.

Operational Planning Considerations. Should the operational commander intend to employ the UUV beyond the bounds prescribed under international law, Presidential or Secretary of Defense approval would be necessary to authorize appropriate Supplemental Rules of Engagement (SROE).

RECOMMENDATIONS

“International law is not a static body of rules but rather a living creature, continually forged and shaped to serve the needs of an international community that itself is constantly changing.”³⁴ As the availability of UUV technology grows in service, a window of opportunity exists for the Combatant Commander to help create and shape the way the UUV is viewed under the lens of international law through standardization of state practice. Until the gap between UUV technology, operational doctrine, and maritime regulatory guidance is bridged, the potential exists to capitalize on existing maritime law as applied to vessels and extend its use to UUV employment to enhance global access from the sea. To revisit the opening vignette of this paper and to apply the results of subsequent analysis, the following measures can be recommended to the operational planner when considering the employment of UUVs:

- Tracking suspect targets on the high seas, in the EEZ, and the CZ with a UUV operating submerged is permissible as long as due regard to the rights of other nations to similarly navigate freely is observed;

- Tracking suspect targets with a UUV within the archipelagic waters (outside sea lanes), territorial seas, or internal waters of a coastal state violates international law unless the consent of the coastal nation is received. In cases of intentional violation of state sovereignty, Presidential or Secretary of Defense SROE approval will be necessary;
- Uninhibited submerged passage is permitted during UUV transit passage of international straits as long as the event is conducted in a continuous and expeditious manner;
- Passage through designated archipelagic sea lanes is permitted by the UUV in the submerged mode of operation as long as it is continuous and expeditious; and,
- Innocent passage by a UUV, without intelligence collection or other military operations, through littoral waters may be conducted in a continuous and expeditious manner, but must be conducted on the surface.

CONCLUSION

U.S. national security interests are intimately linked to the freedom of navigation and the uninhibited movement of forces throughout the world's oceans. The advances afforded by the infusion of UUV technology into today's military capabilities offers great promise to achieve enhanced levels of access and awareness previously unavailable to the Combatant Commander. However, the UUV is also an excellent example of what transpires when advances in both technology and future capability outpace the development of regulatory policy and operational doctrine. As this paper has demonstrated, the operational employment of UUVs in foreign territorial seas under any circumstances violates state sovereignty. Accordingly, the Combatant Commander and his staff should employ the recommended

interim procedures for UUV employment while operational doctrine and maritime law are developed. Furthermore, additional activities should be undertaken at the national level to solidify the true legal status of UUVs under international maritime law and to ensure functional compliance with pertinent regulations to maximize their full potential.

APPENDIX - UUV MISSIONS OVERVIEW

Intelligence, Surveillance, & Reconnaissance (ISR)

The ISR UUV mission objective is covert intelligence data collection from both above and beneath the ocean surface in support of Indications and Warning (I&W) and Intelligence Preparation of the Battlespace (IPB). The types of data include Signals Intelligence (SIGINT), Electronic Intelligence (ELINT), Measurement Intelligence (MASINT), Imagery Intelligence (IMINT), Acoustic Signals Intelligence (ACINT), and Meteorology and Oceanography (METOC). The specific capabilities include: persistent littoral ISR; harbor or port monitoring; Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) monitoring; surveillance sensor emplacement; battle damage assessment; active target designation; and UAV launch and coordination. (DON *UUV Master Plan* 2004, 9, 20-21)

Mine Countermeasures (MCM)

The MCM UUV mission objective is overt and covert rapid establishment of safe Fleet Operating Areas and transit routes from enemy sea mines in support of assured access and IPB. The operational area ranges from the large area deep ocean to the very shallow lanes required by today's naval forces. The specific capabilities include: clearance of off shore deep large areas for carrier and amphibious operations; clearance of Sea Lanes of Communications (SLOC) in and out of ports; clearance of littoral penetration areas; covert reconnaissance of Fleet Operating Areas; and covert Q-Route verification and escort. (DON *UUV Master Plan* 2004, 10, 23, 29)

Anti-Submarine Warfare (ASW)

The ASW UUV mission objective is to "Hold at Risk" all submarines that exit a port or transit a choke point. Additionally, the ability to perform such under any Rules of Engagement (ROE) without inadvertently escalating the stage of conflict is desired. The specific capabilities include the ability to patrol, detect, track, and hand off adversary submarines to U.S. Forces. (DON *UUV Master Plan* 2004, 31)

Inspection / Identification

The ID UUV mission objective is to conduct a rapid search, investigation, and localization of confined areas in support of Homeland Defense (HLD) and Anti-Terrorism/Force Protection (AT/FP). The specific capabilities include the rapid reconnaissance of ship hulls, pier pilings, and mooring areas to detect and localize foreign objects such as unexploded ordinance. (DON *UUV Master Plan* 2004, 39)

Oceanography

The Oceanography UUV mission objectives include the collection of hydrographic, oceanographic, and meteorological data in all ocean environments in support of real-time operations as well as IPB. The specific capabilities include bottom mapping (bathymetry, acoustic and optical imagery, sub-bottom profiling and water column characterization) and ocean current profiling (temperature profiles, salinity profiles, water clarity, bioluminescence, and CBN detection). (DON *UUV Master Plan* 2004, 13-14, 39)

Communications / Navigation Network Node (CN3)

The CN3 UUV mission objective is to provide a low-profile communications and navigation relay function for a wide variety of platforms to include the enabling undersea node of the Net-centric Warfare Sensor Grid for UUV applications as well as the interface to the Global Information Grid (GIG). The specific capabilities include communications (underwater network nodes for data retrieval and exchange and low aspect deployed antennas for SATCOM and GPS) and navigation support (mobile communication relays, antenna to surface GPS capability, and on-demand channel lane markers). (DON *UUV Master Plan* 2004, 14, 42)

Payload Delivery

The Payload Delivery UUV objective is to provide clandestine delivery of payloads required by other mission areas. The specific capabilities include sufficient range, endurance, and capacity to deliver the required payloads for the ISR, Mine Warfare (MIW), ASW, Oceanography, CN3, TCS, and SOF and EOD missions. (DON *UUV Master Plan* 2004, 14, 46)

Information Operations (IO)

The IO UUV mission objectives are to covertly deceive, deter and disrupt the enemy. The specific capabilities include use to jam or inject false data into communications or computer networks and as a submarine decoy. (DON *UUV Master Plan* 2004, 48)

Time Critical Strike (TCS)

The TCS UUV mission objective is to clandestinely deliver weapons against multiple targets of interest at within extremely short time frames. The specific capabilities include use as a weapon delivery platform for leave behind caches and as a remote launch platform used in shallow waters and hazardous areas. (DON *UUV Master Plan* 2004, 51)

ENDNOTES

¹ John C. Brands, “A Truly Transformational Unmanned Undersea Vehicle,” U.S. Naval Institute Proceedings (February 2004): 79.

² Mike Bucchi and Mike Mullen, “Sea Power 21 – Part II Sea Shield: Projecting Global Defensive Assurance,” U.S. Naval Institute Proceedings (November 2002): 58.

³ Department of the Navy, Deputy Assistant Secretary of the Navy and OPNAV N77, *The Navy Unmanned Undersea Vehicle (UUV) Master Plan* (November 2004), xv.

⁴ Douglas H. Stutz, “UUV Use in Support of Operation Iraqi Freedom Recounted,” NAVSEA News Wire, 22(August 2003), <<http://www.globalsecurity.org/military/library/news/2003/08/mil-030822-navsea01.htm>> [6 April 2005], 1-2.

⁵ DON, *UUV Master Plan*, 4.

⁶ DON, *UUV Master Plan*, 4, 67.

⁷ DON, *UUV Master Plan*, 4.

⁸ DON, *UUV Master Plan*, 4, 57.

⁹ DON, *UUV Master Plan*, 73.

¹⁰ Vern Clark, “Sea Power 21 – Part I Projecting Decisive Joint Capabilities,” U.S. Naval Institute Proceedings (October 2002): 33.

¹¹ DON, *UUV Master Plan*, xvi.

¹² DON, *UUV Master Plan*, 67.

¹³ DON, *UUV Master Plan*, 67.

¹⁴ Bucchi and Mullen, “Sea Power 21 – Part II”, 58.

¹⁵ DON, *UUV Master Plan*, xvii.

¹⁶ Milan N. Vego, Operational Warfare Addendum, (Unpublished Book, U.S. Naval War College, Newport, RI: September 2002), 28.

¹⁷ DON, *UUV Master Plan*, 68.

¹⁸ Department of the Navy, Office of the Chief of Naval Operations, and Headquarters, U.S. Marine Corps, and Department of Transportation U.S. Coast Guard, The Commander’s Handbook on the Law of Naval Operations (October 1995), 1-1.

¹⁹ Department of the Navy, United States Navy Regulations – 1990 (September 1990), 40.

²⁰ DON, Commander’s Handbook, 1-4.

²¹ DON, Commander’s Handbook, 1-4.

²² E.D. Brown, The International Law of the Sea, Volume I Introductory Manual (Aldershot UK: Dartmouth Publishing Company Limited 1994), 18.

²³ Department of Defense, National Security and the Convention on the Law of the Sea (Washington, DC: 1994), 3-5.

²⁴ United Nations Conference on the Law of the Sea, United Nations Convention on the Law of the Sea (New York: United Nations Publication 1983), 6-7.

²⁵ U.N., UNCLOS, 6-7.

²⁶ U.N., UNCLOS, 16-17.

²⁷ DOD, National Security, 5.

²⁸ U.N., UNCLOS, 12-13.

²⁹ U.N., UNCLOS, 30-31.

³⁰ Inter-Governmental Maritime Consultative Organization, International Conference on Revision of the International Regulations for Preventing Collisions at Sea, 1972 (London, 1974), 31-32.

³¹ IMO, COLREGS, 36.

³² IMO, COLREGS, 37.

³³ U.N., UNCLOS, 9-10.

³⁴ Horace B. Robertson Jr., "Contemporary International Law Revelant to Today's World?" U.S. Naval War College Review (Summer1992): 103.

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